

PLACEMENT OF THE GENERA *ABELUS* STÅL AND
HEMICENTRUS MELICHAR IN THE SUBFAMILY
CENTROTINAE (HOMOPTERA: MEMBRACIDAE)¹

LEWIS L. DEITZ

Department of Entomology, North Carolina State University, Raleigh, North Carolina 27695-7613.

Abstract.—Distinguishing features of the homopterous families Aetalionidae and Membracidae are listed. The tribe Abelini (including *Ischnocentrus* Stål, 1869, new placement, and *Abelus* Stål, 1869) is reassigned to the membracid subfamily Centrotinae, and a key is given to the three New World centrotine tribes. *Hemicentrus* Melichar, 1914, is assigned to the Old World centrotine tribe Leptocentrini, new placement. Centrotinae, Abelini, and Leptocentrini are described and illustrated.

The taxonomic limits of the family Aetalionidae are in dispute. Evans (1946, 1948) summarized earlier opinions on its composition and concluded that only *Aetalion* Latreille, 1810, and *Darthula* Kirkaldy, 1900, belong to the family. Funkhouser (1951) placed *Euwalkeria* Goding, 1926, with *Aetalion* in the Aetalionidae, but listed *Darthula* in the Membracidae. Metcalf and Wade (1965) placed eight genera in Aetalionidae, including the two genera discussed here: *Abelus* Stål, 1869, and *Hemicentrus* Melichar, 1914. While not including *Abelus* or *Hemicentrus*, Hamilton (1971) assigned 21 genera to the Aetalionidae, seven of which (along with *Euwalkeria*) have since been removed to the membracid subfamily Stegaspinae (Deitz, 1975, 1983).

Having examined representatives of all 25 genera placed in the Aetalionidae by Metcalf and Wade (1965) or Hamilton (1971), I concur with the classifications of Evans (1946, 1948) and Davis (1975) which listed only *Aetalion* and *Darthula* as definite aetalionids. Although lacking the posterior pronotal process which is characteristic of membracids (Table 1), *Abelus* and *Hemicentrus* have definite relatives among the membracid subfamily Centrotinae. Based on similarities in the male and female genitalia, wing venation, and chaetotaxy of the legs, *Abelus* (Figs. 23-32), type-genus of the tribe Abelini, is related to *Ischnocentrus* Stål, 1869 (Figs. 33-43). Likewise, *Hemicentrus* (Figs. 12-22) is related to *Leptocentrus* Stål, 1869, type-genus of the tribe Leptocentrini (Figs. 1-9). Further research, including cladistic analyses, is in progress on the placement of the other genera formerly assigned to the Aetalionidae. Distinguishing features of the Aetalionidae and Membracidae, as here understood, are summarized in Table 1. Davis (1975) previously contrasted the Aetalionidae and Cicadellidae.

¹ Paper No. 9114 of the Journal Series of the North Carolina Agricultural Research Service, Raleigh, NC 27695.

Table 1. Comparison of the families Aetalionidae and Membracidae (Homoptera: Auchenorrhyncha: Membracoidea).

Character	Aetalionidae	Membracidae
Pronotum:	(See Evans, 1946 for figs.)	(Figs. 2, 13, 24, 37)
Posterior process	absent	present (except in <i>Abelus</i> Stål, 1869, and <i>Hemucentrus</i> Melichar, 1914)
Suprahumeral horns	absent	present or absent
Wings:	(See Evans, 1946 for figs.)	(Figs. 3, 20, 25, 38)
Radius	unbranched in fore- and hindwings	branched in fore- or hindwing or both
Claval apex in forewing	uniformly tapered and acute	abruptly acute (most tribes and subfamilies) or uniformly tapered and acute (Hysopronini, Centrodontini, and Stegaspidinae)
Metathoracic legs:	(See Davis, 1975 for figs.)	(Figs. 4, 15, 27, 34)
Tibial row I	absent	present (except in <i>Thuris</i> Funkhouser, 1943, <i>Mendicea</i> Goding, 1926, <i>Bilimekia</i> Fowler, 1895, some <i>Marshallella</i> Goding, 1927, the Stegaspidini, Hemikythini, and some Darnini)
Tibial row II	present (some Aetalioninae) or absent	present (except in <i>Lirania</i> Stål, 1862 and <i>Proterpia</i> Stål, 1867)
Tibial row III	present (Aetalioninae) or absent (Darthulinae)	present (except in <i>Mendicea</i> , <i>Bilimekia</i> , some Stegaspidini, and most Membracinae)
Tibial apex	without a fixed spine at each end of transverse row of apical spurs	with a fixed spine at each end of transverse row of apical spurs
Tarsomere I	with numerous short, thin setae on plantar surface	with relatively few setae on plantar surface
Abdomen:	(See Evans, 1946 for figs.)	
Coarse punctation	absent	present or absent
Segment IX (pygofer)	enormously prolonged in both sexes (Darthulinae) or normal (Aetalioninae)	not prolonged (Figs. 7, 17, 30, 34)
Female second valvulae:	(See Davis, 1975 for figs.)	(Figs. 5, 11, 20, 26, 43; also Deitz, 1975)
Shape in lateral aspect	bladelike and relatively straight or with prominent dorsal convexity	variously shaped, often consistent within tribes
Base of blade with dorsolateral group of small setae	present	absent

Terminology (including wing venation) and methods used here follow Deitz (1975). Lengths represent the distance from the cephalic apex to the abdominal apex. The sections entitled "Material examined" list only specimens studied in detail as a basis for the descriptions of the Leptocentrini and Abelini. For each specimen the determiner, present location, Deitz's code designation, and the sex are included for future reference. In referring to institutions and collections which

hold the material, the following abbreviations are used: AMNH—American Museum of Natural History, New York; JARC—J.A. Ramos Collection, University of Puerto Rico, Mayaguez; NCSU—North Carolina State University, Raleigh; USNM—United States National Museum of Natural History, Washington, D.C.

Family Membracidae Rafinesque, 1815

Subfamily Centrotinae Amyot and Serville, 1843

Figs. 1–43

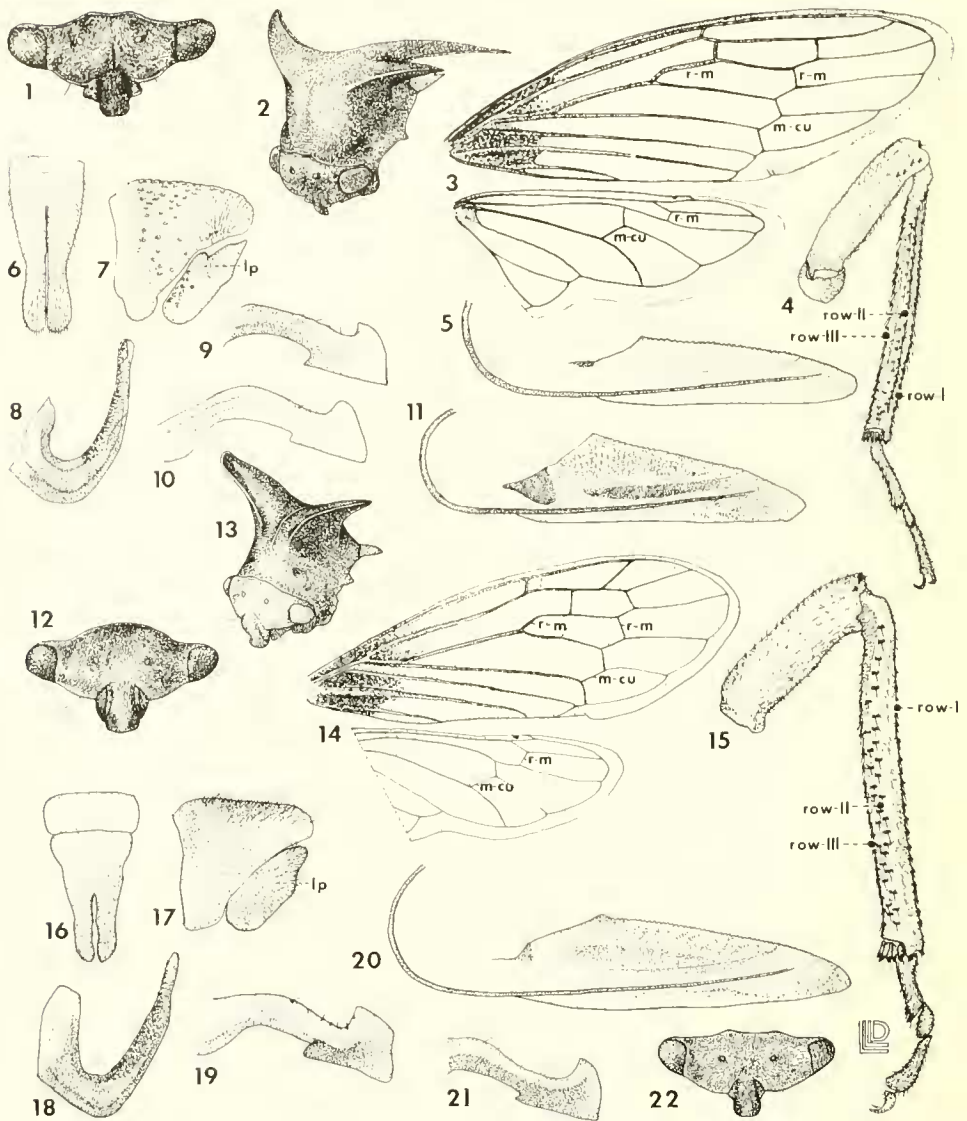
Type-genus: *Centrotus* Fabricius, 1803.

Diagnostic features.—Scutellum laterally or fully exposed. Forewing (Figs. 3, 14, 25, 38) with 2 or 3 r-m crossveins (exception: *Brachybelus* Stål, 1869, with 1 r-m crossvein and R_{4+5} and M_{1+2} contiguous at a single point and separate beyond), claval apex abruptly acute. Tibiae not strongly foliaceous, metathoracic tibia (Figs. 4, 15, 27, 34) more or less triquetrous with 3 longitudinal rows of cucullate setae, row II or III double in some genera. Abdomen moderately to coarsely punctate dorsally and in some genera ventrally.

Description.—Length 2–8 mm. Color black, brown, tan, or mottled, in some genera with contrasting areas of pale pubescence or yellow markings. *Head*: shape of frontoclypeus and ventral margins of vertex various (Figs. 1, 12, 22, 23, 35). *Thorax*: pronotum (Figs. 2, 13, 24, 33, 37) convex, with or without suprahumeral horns, posterior process variable in extent from projecting just slightly above scutellum to projecting beyond abdominal apex (exceptions: *Abelus* Stål and *Hemicentrus* Melichar which lack a posterior pronotal process); scutellum laterally or fully exposed, apex entire or emarginate; forewing (Figs. 3, 14, 25, 38) translucent to hyaline, fully exposed in repose, often coriaceous and punctate basally, venation simple to distally reticulate, with 2 or 3 r-m crossveins (exception: *Brachybelus* Stål with 1 r-m crossvein and R_{4+5} and M_{1+2} contiguous at a single point and separate beyond), with 1 or more m-cu crossveins, clavus abruptly acute apically and with 2 distinct veins, apical limb moderately broad; hindwing venation various; pro- and mesopleura without ventral processes (contrasted with Oxyrhachinae; Capener, 1962); tibiae not strongly foliaceous; mesothoracic tibia with (tribe Abelini, Figs. 28, 36) or without longitudinal rows of cucullate setae; metathoracic femur (Figs. 4, 15, 27, 34) with or without longitudinal row of prominent cucullate setae, tibia usually triquetrous with 3 longitudinal rows of cucullate setae, row II or III double in some genera, tarsus longer than pro- or mesothoracic tarsus, tarsomere I with 2 or fewer cucullate setae apically, tarsomeres II and III without cucullate setae. *Abdomen*: segments moderately to coarsely punctate dorsally and in some genera ventrally. *Male*: lateral plates (Figs. 7, 17, 30, 42) distinct, not fused to pygofer; aedeagus (Figs. 8, 18, 31, 39) U-shaped, shaft with minute teeth or scales on anterior surface. *Female*: sternum VII with posterior margin deeply and broadly emarginate; second valvulae variously shaped (Figs. 5, 11, 20, 26, 43; also Deitz, 1975).

Distribution.—The Centrotinae occur in all major zoogeographical regions of the world (Metcalf and Wade, 1965). Kosztarab's (1982) statement that all New World membracids belong to the subfamily Membracinae is incorrect.

Discussion.—Although apparently related to the subfamilies Oxyrhachinae, Stegaspidae, and Nessorhinae, the Centrotinae may be distinguished by features



Figs. 1-22. Leptocentrini. 1-5, *Leptocentrus bos*. 1, Head, frontal aspect. 2, Pronotum, anterolateral. 3, Right wings. 4, Left metathoracic leg, ablatral. 5, Female second valvulae, lateral. 6-9, *L. taurus*. 6, Male subgenital plate, venter. 7, Male pygofer and lateral plate (lp), lateral. 8, Aedeagus, lateral. 9, Male left style apex, lateral. 10, *Nilautama minutispina*, male left style apex, lateral. 11, *Otinotus bantuantus*, female second valvulae, lateral. 12-20, *Hemicentrus cornutus*. 12, Head, frontal. 13, Pronotum, anterolateral. 14, Right wings. 15, Metathoracic leg, ablatral. 16, Male subgenital plate, venter. 17, Male pygofer and lateral plate (lp), lateral. 18, Aedeagus, lateral. 19, Male left style apex, lateral. 20, Female second valvulae, lateral. 21-22, *H. retusos*. 21, Male left style apex, lateral. 22, Head, frontal.

noted by Deitz (1975) and Capener (1962). Wing venation, the chaetotaxy of the hindlegs and the shape of clavus in the forewings are helpful in separating members of the Centrotinae from the Aetalionidae.

The classification of the Old World Centrotinae needs revision. In Capener's (1968) tribal revision of the African Centrotinae, he noted that the traditional separation of groups based on the presence or absence of suprahumeral horns is largely artificial. Likewise, the present study suggests that less emphasis should be placed on pronotal shape and more emphasis on the genitalia, wing venation, and chaetotaxy of the legs. Although lacking a posterior pronotal process (Fig. 13), the genus *Hemicentrus* Melichar nevertheless belongs to the Old World tribe Leptocentrini which is redescribed below.

The New World centrotine genera have been placed in 2 tribes, Boocerini and Platycentrini (Deitz, 1975), and here the tribe Abelini is added to these (see key below). Again, the previous placement of Abelini in the Aetalionidae was seemingly based on superficial features of the pronotum.

KEY TO THE NEW WORLD TRIBES OF CENTROTINAE

1. Mesothoracic tibia (Figs. 28, 36) with 2 longitudinal rows of cucullate setae; posterior pronotal process absent (Fig. 24) or greatly reduced and spinelike (Figs. 33, 37) Abelini
 - Mesothoracic tibia without longitudinal rows of cucullate setae; posterior pronotal process better developed 2
2. Forewings with 2 or more m-cu crossveins; scutellum exposed laterally but concealed by pronotum medially Platycentrini
 - Forewings with 1 m-cu crossvein (exception: *Ophicentrus* Fowler, 1896, which lacks m-cu crossvein but has M_{3+4} and Cu_1 contiguous at 1 point and separate beyond); scutellum either exposed laterally or entirely Boocerini

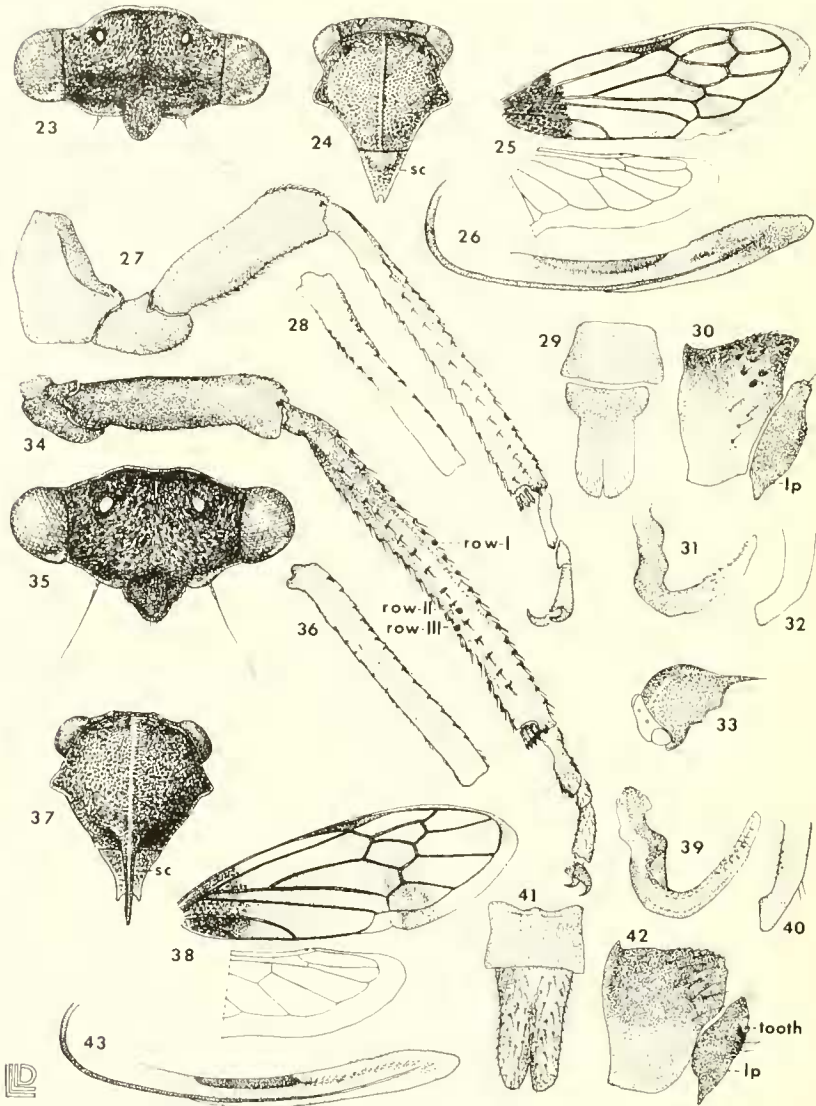
Tribe Abelini Goding, 1930 (New World)

Figs. 23–43

Type-genus: *Abelus* Stål, 1869.

Diagnostic features.—Head (Figs. 23, 35) with vertex lacking toothlike ventral projections; frontoclypeal lobes not distinct from frontoclypeus. Pronotum (Figs. 24, 33, 37) with posterior process absent or greatly reduced; scutellum fully exposed, apex emarginate. Forewing (Figs. 25, 38) with pterostigma, with 2 r-m and 1 m-cu crossveins. Hindwings with 1 r-m and 1 m-cu crossvein. Mesothoracic tibia (Figs. 28, 36) with 2 longitudinal rows of cucullate setae. Male lateral plate (Figs. 30, 42) with or without posterior tooth; styles (Figs. 32, 40) curved and more or less truncate apically. Female second valvulae (Figs. 26, 43) narrow and elongate, slightly broader apically.

Description.—Length 3–4 mm. Color black, brown, or tan, pronotum in some species with pale middorsal stripe, legs dark basally and pale distally; areas of pale pubescence present especially laterally; thorax in some species with white waxy secretions laterally and on base of scutellum. *Head*: vertex (Figs. 23, 35) without toothlike ventral projections; frontoclypeal lobes not distinct from frontoclypeus. *Thorax*: pronotum (Figs. 24, 33, 37) without suprahumeral horns, posterior process absent (*Abelus* Stål) or greatly reduced, spinelike, and elevated above scutellum (*Ischnocentrus* Stål); scutellum (Figs. 24, 37) fully exposed, apex emarginate; forewing (Figs. 25, 38) hyaline with dark markings, pterostigma present at confluence of Sc and R_1 , with 2 r-m and 1 m-cu crossveins; hindwing (Figs.



Figs. 23-43. Abelini. 23-32, *Abelus luctuosus*. 23, Head, frontal aspect. 24, Pronotum and scutellum (sc), dorsal. 25, Right wings. 26, Female second valvulae, lateral. 27, Left metathoracic leg, ablatlateral. 28, Left mesothoracic tibia, ablatlateral. 29, Male subgenital plate, venter. 30, Male pygofer and lateral plate (lp), lateral. 31, Aedeagus, lateral. 32, Male left style apex, dorsolateral. 33, *Ischnocentrus niger*, pronotum, anterolateral. 34-42, *Ischnocentrus* sp., #83-331a ♂. 34, Left metathoracic leg, ablatlateral. 35, Head, frontal. 36, Left mesothoracic tibia, ablatlateral. 37, Pronotum and scutellum (sc), dorsal. 38, Right wings. 39, Aedeagus, lateral. 40, Male style apex, dorsolateral. 41, Male subgenital plate, venter. 42, Male pygofer and lateral plate (lp), lateral. 43, *Ischnocentrus* sp., #83-331b ♀, second valvulae, lateral.

25, 38) with 1 r-m and 1 m-cu crossvein; mesothoracic tibia (Figs. 28, 36) with 2 longitudinal rows of cucullate setae ablatlateral; metathoracic femur (Figs. 27, 34) without rows of cucullate setae, tibia with all 3 rows single, tarsomere I with 1 to 3 cucullate setae apically. *Male*: lateral plate (Figs. 30, 42) with (*Ischnocentrus*)

or without (*Abelus*) posterior tooth, with ventral lobe; style (Figs. 32, 40) curved and more or less truncate apically. *Female*: second valvulae (Figs. 26, 43) elongate, narrow in area of dorsomedial fusion, slightly broader apically, dorsal margin with small teeth apically.

Distribution.—The tribe Abelini occurs only in the Neotropical region, from Nicaragua south to Bolivia (material examined, Metcalf and Wade, 1965).

Discussion.—The tribe Abelini has all the features of the subfamily Centrotinae as described above, but its members are easily distinguished from those of other centrotine tribes by the presence of rows of cucullate setae on the mesothoracic tibiae (Figs. 28, 36). Additionally, the pronotum is quite simple (Figs. 24, 33, 37), armed at most with a short spinelike posterior process.

Abelini includes only 2 genera: *Abelus* Stål, 1869 (type-species: *A. luctuosus* Stål, 1869, by monotypy) and *Ischnocentrus* Stål, 1869 (type-species: *I. niger* Stål, 1869, by subsequent designation of Funkhouser (1927)).

Morphologically, the 2 genera differ primarily in the degree to which the posterior pronotal process is developed (Figs. 24, 33, 37) and in males, the presence or absence of a posterior tooth on the lateral plates (Figs. 30, 42). The geographic ranges of *Ischnocentrus* (Nicaragua, Costa Rica, Panama, Ecuador, Guyana, French Guiana, and Colombia) and *Abelus* (Colombia, Venezuela, Peru, and Bolivia) overlap in Colombia (material examined, Metcalf and Wade, 1965).

In Stål's (1869) original description of *Abelus*, he noted that the genus was related and structurally similar to *Ischnocentrus*, but Goding (1930) who erected the tribe Abelini (as Abelusini, in the Aetalioninae, Membracidae) included in it only the genus *Abelus*. Although Funkhouser (1951) appropriately treated Abelini as a tribe of the Centrotinae (Membracidae), he placed in the tribe 12 additional genera, while assigning *Ischnocentrus* to the "Hebesini" (the latter is not considered to be validly derived because it is not based on a published genus name). Lastly, Metcalf and Wade (1965) placed *Ischnocentrus* in the tribe Boocerini (Membracidae: Centrotinae), but assigned the Abelini to the Aetalionidae, with the result that *Abelus* and *Ischnocentrus* were not only in different tribes, but also different families. Aside from the type-genus, none of the genera formerly placed in the Abelini (Funkhouser, 1951; Metcalf and Wade, 1965) are appropriately ascribed to this tribe.

Material examined.—*Abelus* sp., determined L. L. Deitz, JARC, #83-331c ♂, #83-331d ♀; *A. luctuosus* Stål, det. W. D. Funkhouser, USNM, #82-83b ♂—as det. in Funkhouser Collection, USNM, #82-83c ♀; *Ischnocentrus* sp(p)., det. L. L. Deitz, AMNH, #72-148e ♂, #72-148f ♂, #72-148g ♀, #72-148h ♀—NCSU, #70-231c ♀, #70-231d ♂, #83-331a ♂—JARC, #83-331b ♀; *I. niger* Stål, as det. in USNM, #71-81h ♀, #71-81i ♂.

Tribe Leptocentrini Distant, 1908 (Old World)

Figs. 1–22

Type-genus: *Leptocentrus* Stål, 1866.

Diagnostic features.—Head (Figs. 1, 12, 22) with vertex lacking toothlike ventral projections; frontoclypeal lobes more or less prominent. Pronotum (Figs. 2, 13) with or without posterior process extending above scutellum; scutellum fully exposed, apex emarginate. Forewing (Figs. 3, 14) without pterostigma, with 2 or 3 r-m crossveins and 1 m-cu crossvein. Hindwing with 1 r-m and 1 m-cu crossvein.

Mesothoracic tibia without rows of cucullate setae. Male lateral plate (Figs. 7, 17) without tooth; style apex (Figs. 9, 10, 19, 21) expanded, triangular. Female second valvulae (Figs. 5, 11, 20) broadened dorsally near midlength and gradually tapering apically.

Description.—Length 4–8 mm. Color black, brown, or tan, often with areas of white or yellow pubescence laterally and ventrally. *Head*: (Figs. 1, 12, 22) vertex without toothlike ventral projections; frontoclypeal lobes more or less prominent. *Thorax*: pronotum (Figs. 2, 13) with or without suprahumeral horns, with (most genera) or without (*Hemicentrus* Melichar) elongate posterior process extending above scutellum; scutellum fully exposed, apex emarginate; forewing (Figs. 3, 14) without pterostigma, with 2 or 3 r-m crossveins and 1 m-cu crossvein; hindwing (Figs. 3, 14) with 1 r-m and 1 m-cu crossvein; mesothoracic tibia without rows of cucullate setae; metathoracic femur (Figs. 4, 15) without rows of cucullate setae, tibia with row II scattered or double. *Male*: lateral plate (Figs. 7, 17) without tooth; style apex (Figs. 9, 10, 19, 21) expanded, triangular. *Female*: second valvulae (Figs. 5, 11, 20) narrow basally, broadened dorsally near midlength and gradually tapering apically, dorsal margin with numerous, small teeth or crenulations posterior to broadest point of blade.

Distribution.—Members of the Leptocentrini, as defined above, occur in the Afrotropical, Oriental, and Palearctic regions (Metcalf and Wade, 1965; Capener, 1968; Nast, 1972). It is uncertain if any of the Australian genera should be ascribed to this tribe (Evans, 1966). All of the New World genera listed as Leptocentrini by Metcalf and Wade (1965) have been moved elsewhere (see discussion, below).

Discussion.—Metcalf and Wade (1965) assigned 38 genera to the Leptocentrini. Capener (1968) listed 17 genera of African Leptocentrini, including 4 new genera and 9 others not placed in the tribe by Metcalf and Wade; Capener removed *Xiphopoeus* Stål, 1866, to the Xiphopoeini (Centrotinae) and *Acanthophyses* Stål, 1866, to the Centrotini. Deitz (1975) assigned *Orthobelus* Stål, 1869, and the 14 strictly New World genera included in the Leptocentrini by Metcalf and Wade (1965) to various other tribes: Boocerini and Platycentrini (Centrotinae), Nessorhinini (Nessorhininae), Quadrinarcini (Smiliinae), and Microcentrini (Stegaspidinae).

The description above further limits the tribe to those genera in which there is a single m-cu crossvein in the forewings (Figs. 3, 14). This definition excludes a number of genera which differ from *Leptocentrus* in several other features, including the male and female genitalia: *Centrotusoides* Distant, 1916, and *Centruchus* Stål, 1866, placed in the Leptocentrini by Capener (1968), the Australian genera *Cebes* Distant, 1916, *Eufairmairia* Distant, 1916, *Eufrenchia* Goding, 1903, and *Lubra* Goding, 1902, and perhaps some other genera placed in the tribe by Metcalf and Wade (1965) which I have not examined.

A complete listing of the genera belonging to the Leptocentrini as defined above necessarily awaits further studies of the Old World centrotine genera.

Placement of *Hemicentrus* Melichar in the Leptocentrini.—*Hemicentrus* Melichar, 1914 (type-species: *H. bicornis* Melichar, 1914, by original designation and monotypy), is morphologically very similar to *Leptocentrus* Stål, 1866 (type-species: *Centrotus bos* Signoret in Fairmaire and Signoret, 1858, by subsequent designation of Buckton (1903)), and the other leptocentrine genera studied (see material examined). Especially striking are similarities in the genitalia of both

sexes (Figs. 6–11, 16–21). The lateral processes of the pronotum are also similar in *Hemicentrus* and *Leptocentrus* (Figs. 2, 13) but members of *Hemicentrus* lack the posterior pronotal process, and they have prominent frontoclypeal lobes (Figs. 12, 22) than members of *Leptocentrus* (Fig. 1).

Geographically, *Hemicentrus* occurs within the range of the tribe Leptocentrini, apparently being restricted to the Oriental region (Metcalf and Wade, 1965).

Historically, Melichar (1914) described *Hemicentrus* in the Centrotidae [sic], and Funkhouser (1927) placed the genus in the subfamily Centrotinae (Membracidae). Goding (1930) assigned *Hemicentrus* to the Aetalioninae (Membracidae) and later (1931, 1934) to the tribe Tolaniini of the Aetalionidae. (Although superficially similar to *Tolania* Stål, 1858, *Hemicentrus* differs in features of the forewings, male genitalia, and chaetotaxy of the legs, and also in having coarse abdominal punctuation.) Evans (1946), who treated the Aetalionidae as a distinct family, considered *Hemicentrus* to be a membracid. Funkhouser (1951) included *Hemicentrus* in the Darthulini (Membracidae: Centrotinae). (*Darthula* Kirkaldy, like *Hemicentrus*, occurs only in the Oriental region, but morphologically is much closer to *Aetalion* Latreille than to *Hemicentrus*.) Metcalf and Wade (1965) placed *Hemicentrus* in the tribe Tolaniini (Aetalionidae: Aetalioninae). Lastly, Strümpel (1972) considered *Hemicentrus* to be closely related to the New World family Biturritiidae, but *Hemicentrus* differs greatly from *Biturritia* Goding, 1930, in features of the genitalia and forewings, and in the shape of head, scutellum, and pronotum.

Material examined.—*Bathoutha indicans* (Walker), as determined in USNM, #83-334b ♀; *Bocchar montanus* Jacobi, det. W. D. Funkhouser, USNM, #83-334c ♂—as det. in USNM, #83-334d ♀; *Hemicentrus cornutus* (Funkhouser), as det. Funkhouser Collection, USNM, #82-115d ♀, #82-115e ♂; *H. retusus* (Distant) [det. as *Sarritor retusus* Distant, by W. D. Funkhouser], USNM, #83-227a ♂; *Leptocentrus* sp., as det. in NCSU, #70-210c ♀; *L. bos* (Signoret in Fairmaire and Signoret), det. W. L. McAtee, USNM, #71-299b ♀; *L. lama* (Signoret in Fairmaire and Signoret), as det. in NCSU, #81-42b ♀; *L. taurus* (Fabricius), det. Z. P. Metcalf, NCSU, #81-42b ♀, #81-42c ♂; *Nilautama minutispina* Funkhouser, det. W. D. Funkhouser, USNM, #83-334g ♀—as det. in Funkhouser Collection, USNM, #83-334h ♂; *N. typica* Distant, as det. in NCSU, #81-42h ♀; *Otinotus bantuantus* (Distant), det. A. L. Capener, USNM, #83-334e ♂, #83-334f ♀; *O. elongatus* Distant, det. Z. P. Metcalf, NCSU, #81-42e ♀, #81-42f ♂.

CONCLUSIONS

Based on characters discussed above, the genera *Abelus* Stål and *Hemicentrus* Melichar belong to the membracid subfamily Centrotinae: *Abelus* in the New World tribe Abelini, *Hemicentrus* in the Old World tribe Leptocentrini. Nevertheless, both genera lack a posterior pronotal process, the presence of which is generally regarded as a synapomorphy of the family Membracidae. Its absence in *Abelus* and *Hemicentrus* is likely to be secondarily derived, rather than plesiomorphic, because members of both genera have a more reduced forewing venation (only 1 m-cu crossvein) than would be expected in an ancestor of the membracids. The lack of a posterior pronotal process in the Aetalionidae may be plesiomorphic, but its members, with R unbranched in both pairs of wings and with at most 2

rows of cucullate setae on the hind tibia, are also unlikely to have been ancestral to the Membracidae.

ACKNOWLEDGMENTS

For loaning specimens, I am grateful to: C. Butcher, Entomology Division, DSIR, Auckland, New Zealand; J. W. Evans, % Australian Museum, Sydney; R. C. Froeschner, U.S. National Museum of Natural History, Washington, D.C.; W. J. Knight, British Museum (Natural History), London; J. P. Kramer, Systematic Entomology Laboratory, U.S. Dept. Agric., % U.S. National Museum of Natural History; N. Møller Anderson, Zoologiske Museum, Copenhagen; J. A. Ramos, University of Puerto Rico, Mayaguez; and P. Wygodzinsky, American Museum of Natural History, New York.

LITERATURE CITED

- Buckton, G. W. 1903. Pp. 181-296. *In* Buckton, G. W., ed., 1901-1903. A Monograph of the Membracidae. Lovell Reeve & Co., London, 296 pp.
- Capener, A. L. 1962. The taxonomy of the African Membracidae. Part 1. The Oxyrhachinae. Entomol. Mem. 6. Dep. Agr. Services, Pretoria, South Africa. 123 pp.
- . 1968. The taxonomy of the African Membracidae. Part 2. The Centrotinae. Entomol. Mem. 17, Dep. Agr. Services, Pretoria, South Africa. 124 pp.
- Davis, R. B. 1975. Classification of selected higher categories of auchenorrhynchous Homoptera (Cicadellidae and Aetalionidae). U.S. Dep. Agr. Tech. Bull. 1494. 52 pp.
- Deitz, L. L. 1975. Classification of the higher categories of the New World treehoppers (Homoptera: Membracidae). N.C. Agr. Exp. Sta. Tech. Bull. 225. 177 pp.
- . 1983. Name changes in the Membracidae (Homoptera). Proc. Entomol. Soc. Wash. 85: 856-857.
- Evans, J. W. 1946. A natural classification of leaf-hoppers (Homoptera, Jassoidea). Part 2: Aetalionidae, Hylcidae, Eurymelidae. Trans. R. Entomol. Soc. Lond. 97: 39-54.
- . 1948. Some observations on the classification of the Membracidae and on the ancestry, phylogeny and distribution of the Jassoidea. Trans. R. Entomol. Soc. Lond. 99: 497-515.
- . 1966. The leafhoppers and froghoppers of Australia and New Zealand (Homoptera: Cicadelloidea and Cercopoidea). Aust. Mus. Mem. 12. 347 pp.
- Funkhouser, W. D. 1927. Membracidae. General Catalogue of the Hemiptera. Fascicle 1. Smith College, Northampton, Mass. 581 pp.
- . 1951. Homoptera Fam. Membracidae. Genera Insectorum, Fascicle 208, Brussels, Belgium. 383 pp.
- Goding, F. W. 1930. Membracidae in the American Museum of Natural History. Am. Mus. Novit. 421: 1-27.
- . 1931. Classification of the Old World Membracidae. J. N. Y. Entomol. Soc. 39: 299-313.
- . 1934. The Old World Membracidae. J. N. Y. Entomol. Soc. 42: 451-480.
- Hamilton, K. G. A. 1971. Placement of the genus *Microcentrus* in the Aetalionidae (Homoptera: Cicadelloidea), with a redefinition of the family. J. Ga. Entomol. Soc. 6: 229-236.
- Kosztarab, M. 1982. Homoptera, pp. 447-470. *In* Parker, S. P., ed., Synopsis and Classification of Living Organisms. McGraw-Hill Inc., New York. Vol. 2. 1232 pp.
- Melichar, L. 1914. Homoptera von Java, gesammelt von Herrn. Edw. Jacobson. Notes Leyden Mus. 36: 91-147.
- Metcalf, Z. P., and V. Wade. 1965. General Catalogue of the Homoptera. A Supplement to Fascicle 1—Membracidae of the General Catalogue of Hemiptera. Membracoidea. Sections I and II. N.C. State University, Raleigh. 1552 pp.
- Nast, J. 1972. Palaearctic Auchenorrhyncha (Homoptera), an annotated check list. Polish Scientific Publ. (Pol. Acad. Sci., Inst. Zool.), Warsaw. 550 pp.
- Stål, C. 1869. Bidrag till Membracidernas kannedom. Öfvers. Kongl. Vetensk.-Akad. Förhandl. 1869: 231-300.
- Strümpel, H. 1972. Beitrag zur Phylogenie der Membracidae Rafinesque. Zool. Jahrb. Abt. Syst. Ökol. Geogr. Tiere 99: 313-407.